Abstract Submitted
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Conductivity and Stability of Photopolymerized Polymer Electrolyte Network[1] THEIN KYU, RUIXUAN HE, YU-MING CHEN, JIALIN MAO, YU ZHU, University of Akron, DR. KYU'S GROUP AND DR. ZHU'S GROUP COLLABORATION — A melt-processing window has been identified within the wide isotropic region of the phase diagram of ternary blends consisting of poly (ethylene glycol diacrylate) (PEGDA), tetraethylene glycol dimethyl ether (TEGDME) and lithium bis(trifluoromethane) sulfonamide (LiTFSI). Upon UV-crosslinking of PEGDA in the isotropic window, the polymer electrolyte membrane (PEM) network thus formed is completely transparent and remains in the single phase without undergoing polymerization-induced phase separation or polymerization-induced crystallization. These PEM networks are solid albeit flexible and light-weight with safety and space saving attributes. The ionic conductivity as determined by AC impedance spectroscopy exhibited very high room-temperature ionic conductivity on the order of $\sim 10^{-3}$ S/cm in several compositions, viz., 10/45/45, 20/40/40 and 30/35/35 PEGDA/TEGDME/LiTFSI networks. Cyclic voltammetry measurement of these solid-state PEM networks revealed excellent electrochemical stability against lithium reference electrode. The above study has been extended to the anode (graphite) and cathode ($LiFePO_4$) half-cell configurations with lithium as counter electrode. Charge/discharge cycling behavior of these half cells will be discussed.

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